



PIER Energy System Integration Program Area

CEIDS Consortium for Electric Infrastructure to support a Digital Society

Contract #: 500-02-014 **Work Authorization #:** E2I-WA-112

Contractor: Electricity Innovation Institute

Project Amount: \$500,000

Contractor Project Manager: Mark Samoty

Commission Contract Manager: Laurie ten Hope (916) 654-5045

Status: Active

Project Description:

The CEIDS collaborative research initiative supports recommendations made in Electrical Power Research Institute's (EPRI) *Electricity Technology Roadmap*-EPRI's long-term strategic vision, forecasting society's electrical needs on a 25-year basis. The partnership between the Energy Commission and the CEIDS program will work towards actively developing a strategic framework to upgrade the electrical delivery system. The Energy Commission served as one of the partners of the CEID's Consortium which is focusing on the long-term vision of transforming the power delivery system to a modern intelligent system that will meet society's needs in the future.

This project supports the PIER Program objectives of:

- Improving the energy cost/value of California's electricity by development of business cases for the new functionalities of the power delivery system of the future.
- Improving the reliability, quality, and sufficiency of California's electricity by identifying new science and technology developments needed for the power delivery system of the future.

Project Status:

PIER participated in this collaborative effort for one year. CEC Participation ended December 30, 2004. Because PIER has access to all results of the collaborative effort from the beginning of the program, all results delivered to date are listed below. Deliverables can be found on the EPRI website at:

www.epri-intelligrid.com/intelligrid/home.jsp

Creation of the Vision of the Power Delivery System of the Future

- Developed a high level vision for the power delivery system of the future – *CEIDS Master Plan, July 2003*.
- Developed a set of functional requirements for the power delivery system of the future – *Integrated Energy and Communications System Architecture Vol. II, Functional Requirements, August 2004*.

Development of Open Platforms around Critical Integrating Technologies

- Communications:
 - Developed a set of requirements for the communications infrastructure needed to support the for the power delivery system of the future – *Integrated Energy and Communications System Architecture Vol. II, Functional Requirements, August 2004*.

- Developed a methodology and tools for utilities to use when designing communications systems – *Integrated Energy and Communications System Architecture Vol. I, User Guidelines and Recommendations, August 2004.*
- Developed recommendations for standards and technologies for utilities to use when designing and installing communications systems– *Integrated Energy and Communications System Architecture Vol. I, User Guidelines and Recommendations, August 2004.*
- Developed draft communications object models for fuel cells and reciprocating engines - *DER/ADA Object Model Report Final Draft, December 2003.*
- Initiated work to define the requirements for a communications portal that will enable consumers to participate in energy markets and to receive energy-related services.
- State of the art and trends of communications in utilities systems *Inventory of Utility Communications, March 2004.*
- Examples of how the IntelliGrid Architecture is being used:
 - The “strawman reference design for demand response information exchange” published by the California Energy Commission in November 2004.
 - The OpenAmi Infrastructure with Demand Response Specification Document currently developed by the OpenAmi users group.
 - Designing and installing an advanced remedial action scheme at SRP (work performed by GE).
- Computing
 - Initiated work to develop the distributed computing architecture needed to support the IntelliGrid (*November 2004*).

Clarify Key Areas of Uncertainty

- Developed a methodology for determining the appropriate level of quality and reliability for energy consumer – *Analysis of Extremely Reliable Power Delivery Systems – November 2002.*
- Published a study that determines the cost of power outages and disturbances in the U.S. – *The Cost of Power Disturbances to Industrial and Digital Technology Companies, July 2001.*
- Published a study on how distributed generation can be used in the operations of power systems under normal operating conditions – *Studies of Distribution Operations to Aid in Determining Object Models for Distributed Energy Resources, December 2003.*
- Initiated a study on how distributed generation can be used in the operations of power systems under emergency conditions (*December 2004*).
- Published business case analysis for power electronic-based power flow controllers - *Business Case Assessment for power electronic-based power flow controllers, December 2003.*
- Published business case analysis for a consumer communications portal – *Business Case Assessment for Energy Service Portals, March 2004.*

Identifying New Science and Technology Developments Needed for the Power Delivery System of the Future

- Published a technology analysis with a recommended approach for developing a consumer communications portal – *Energy Service Portal Development – Assessment and Recommendations, December 2003.*
- Published a technology analysis that identified key technology development activities needed for power electronic-based power flow controllers – *Advanced Power Electronics Technology Assessment – December 2003.*

Influencing and Contributing to Relevant Standards Development Efforts

- Created IEC and IEEE working groups on communication, command and control of distributed energy resources.

Demonstrations of Critical Aspects of the New Functionalities That Make Up the Power Delivery System of the Future

- Initiated several demonstration projects with CEIDS partners implementing the methodology, tools and recommendations for installing communications systems.